THE PHONOLOGICAL COMPLEXITY OF KAPAU

Alan Healey

0. Introduction
1. Phonemes
2. Syllable Structure and Phoneme Distribution
3. Allophones
4. Additional Phoneme Sequences
5. Glottal Stop
6. Syllabic Nasals
7. Tone

0. INTRODUCTION

The Kapau (or Hamtai) language is spoken by about 35,000 people inhabiting some 5,000 square kilometres in the Morobe and Gulf Provinces of Papua New Guinea. It is a member of the Angan Family of languages (Lloyd and Healey 1970:46-8, Hooley and McElhanon 1970:1077-8, Lloyd 1973:36, 84-5). The Angan languages are noted for their phonological and grammatical complexity, and Kapau is no exception in this regard. Although the phonology is described here in terms of only 21 phonemes, the phonetic details, the syllable structure, and the tonal system give considerable difficulty to the would-be learner or analyst.

The data presented here are taken from three sources: Kapau Dictionary (New Tribes Mission, n.d.), Kapau Pedagogical Grammar (Oates and Oates 1968), and from my own field notes taken during a 14-day visit to Slate Creek near Bulolo in 1958. Although my stay there was brief, I was greatly assisted by my colleague, the late W.J. Oates, who elicited the data for me to transcribe, and by the staff of the New Tribes Mission there, who kindly made their language materials available.

1. PHONEMES

The phoneme inventory is quite simple, consisting of 12 consonants, 7 vowels, and two tonemes.

p	t	k	k̥	ʔ	i	ɨ	u	´ (high tone)
m	n	ŋ			e	ʌ	o	` (low tone)
v	y	w		h		a		

The velar and backed velar stops /k/ and /k̥/ are somewhat difficult for English speakers to distinguish. Some contrastive sets are listed below.

/kimʌ/	'I will chew'	/k̥imʌ/	'he went on top'
/kemʌ/	'a bird'	/k̥eʔʌ/	'liver'
/kɨmo/	'green vegetables'	/k̥ɨmpa/	'sugarcane pith'
/kʌpʌ/	'underground water'	/k̥ʌvʌ/[1]	'bandage'
/kaʔyʌ/	'a bird'	/k̥aʔwʌ/	'a grass'
/kuwʌ/	'goanna'	/k̥uwʌ/	'steal'; 'nearby'
/ko/	'pitpit'	/k̥o/	'bamboo joint'
/kweʔa/	'dry'	/k̥weʔi/	'put down'
/hokʌ/	'a frog'	/ok̥a/	'truly'
/hʌko/[2]	'container'	/ʌk̥o/	'he'
/yɨmkʌ/	'scar'	/itɨmk̥ʌ/	'clothing, wrap'

The vowel /ɨ/ has given some difficulty to English speakers who are studying the language. There are several reasons for this.

(a) Kapau /ɨ/ is frequently stressed, whereas the phonetically similar English vowel is always unstressed.

(b) It does not occur in certain environments (word initially, word finally, or in the first syllable following initial /m/, /n/, or /w/), and the learner is frequently tempted to doubt its contrastiveness.

(c) It is awkward to represent in a practical alphabet, and has been left unwritten in the Kapau literature.

However, /ɨ/ is a genuine vowel phoneme in Kapau. It carries a toneme like the other vowels, and in the medial contexts in which it occurs it is in clear contrast with all six of the other vowels.

/piʔtʌ/	'you will pass up'	/piŋʌ/	'moss'
/petʌ/	'he will die'	/peŋʌ/	'a bird'
/pɨʔtʌ/	'you will come'	/pɨŋʌ/	'pool'
/pʌtʌ/	'he will come'	/pʌŋʌ/	'betel nut'
/pato/	'we all will come'	/paŋo/	'vagina'
/puʔtʌ/	'you will pass along'	/ok̥a/	'truly'
/poʔtʌ/	'you will pass down'	/ukʌ/	'vine'

---

[1] From my field notes. The Dictionary has /k̥ʌva/.

[2] From my field notes. The Dictionary has /hʌkʌ/.

2. SYLLABLE STRUCTURE AND PHONEME DISTRIBUTION

The majority of Kapau words comprise from one to six syllables. A syllable usually consists of one or two vowels, optionally preceded by one or two consonants and optionally followed by one consonant. This may be represented by the general formula

$$(C_1)(C_2)\ V_3\ (V_4)(C_5)$$

in which

C_1 = /p, t, k, k̥, m, n, ŋ, v, y, w/

C_2 = /w, h/

V_3 = /i, ɨ, u, e, ʌ, o, a/

V_4 = /i, u/

C_5 = /m, n, ŋ/

Within such syllables there are a few limitations not expressed in this formula.

(a) Sequences /vw/, /yw/, and /ww/ have not been observed as syllable onset C_1C_2.

(b) The vowel /ɨ/ has not been observed in a complex syllable nucleus V_3V_4, nor have the sequences /ii/ and /uu/.

(c) The sequence /wɨ/ has not been observed.

At the boundary of two syllables, only the medial sequences /mp/, /mt/, /mk/, /mk̥/, /nt/, /ŋk/, /ŋk/, /mn/, and /mŋ/ have been observed as C_5C_1, and only /mkw/ and /mth/ have been observed as $C_5C_1C_2$.

At word boundaries there are further limitations.

(a) /ŋ/ does not occur word initially or word finally.

(b) /ɨ/ does not occur word finally; and in terms of the analysis presented thus far, it does not occur word initially either.

(c) The sequences /mɨ/ and /nɨ/ do not occur word initially.

(d) /v/ occurs word initially only in the sequence /vh/.

3. ALLOPHONES

3.1 Stops

In word initial position the stops /p, t, k, k̥/ are voiceless; in medial positions they vary freely between voiceless and lenis voiced. When followed by a vowel they are unaspirated; when followed by /h/ they are aspirated, the /h/ constituting the aspiration. This analysis of aspirated stops as a sequence of two consonants is supported by evidence from verb paradigms. The suffixes /-hi/ 'you/they (dual)' and /-hu/ 'you/they (plural)' occur in about half of the paradigms (mostly those having a future component) and always follow a consonant. Thus we have numerous instances of aspirated stops where there is a morpheme boundary between the stop and the aspiration.

/phunʌ/	'they will come along past'	(stem /pu/)
/thunʌ/	'they will speak'	(stem /t/)
/yʌmʌkhunʌ/	'they will make'	(stem /yʌmʌk/)
/k̥hiutʌ/	'if they do'	(prefix /k̥-/, stem /i/)

Alveolar consonants /t/ and /n/ have alveopalatal allophones [t̡] and [ñ] following /i/.

/whaintokʌ/	[Waiñt̡okʌ]	'swing'

3.2 Nasals

When /h/ follows a nasal there are two freely varying phonetic results. Either the nasal has a voiceless nasal offglide or the /h/ is a voiced breathy vocoid [ħ] of the same quality as the following vowel.

/mh/ = [m$^{\mathrm{M}}$h] or [mħ]
/nh/ = [n$^{\mathrm{N}}$h] or [nħ]
/ŋh/ = [ŋ$^{\text{Ŋ}}$h] or [ŋħ]

/mhaunʌ/	'they will get'	(stem /ma/)
/nhunʌ/	'they will eat'	(stem /n/)
/k̥iyʌŋhutʌ/	'they will have done'	(prefix /k-/, stem /iy/, suffix °/-ʌŋ/

3.3 /v/, /w/, and /y/

In intervocalic positions /y/ is a non-syllabic high front vocoid, but in word initial positions it varies freely from non-syllabic vocoid [i̯] to a voiced lenis alveopalatal fricative, either flat [y̟] or grooved [ž].

When /h/ follows /v, w, y/ the sequence of two phonemes results in a single sound phonetically.

/vh/ = [f]
/wh/ = [W]
/yh/ = [š] initially and [š]/[ž̰] medially

These phoneme combinations are not some fanciful interpretation of the phonetics, but are supported by the evidence of morpheme combinations in the verbs.

/va/	+ /-hunʌ/	→	/vhaunʌ/	[faunʌ]	'they will dig'
/tawi/	+ /-hunʌ/	→	/tawhiunʌ/	[taWiunʌ]	'they will cut it across'
/yʌ/	+ /-hunʌ/	→	/yhʌunʌ/	[šʌunʌ]	'they will shell (beans)'

3.4 Contrasts Involving /h/

/pe/	'a spider'	/phe/	'navel'
/piŋʌ/	'ground moss'	/phiŋʌ/	'rice weevil'
/tʌ/	'fire'	/thʌ/	'like this'
/koko/	'a grass'	/khoŋkʌ/	'lymph gland in groin'
/ḳokʌ/	'male'	/ḳhoukʌ/	'long'
/ḳeˀʌ/	'liver'	/ḳheˀʌ/	'I am putting'
/mʌ/	'yes'	/mha/	'below'
/meˀʌ/	'lips'	/mhekʌ/	'hoop pine'
/naŋo/	'meat'	/nhaˀa/	'mine'
/ḳiyaŋuwʌ/	'of course they are doing'	/ḳiyaŋhutʌ/	'they will have done'
/ivʌ/	'bark cape'	/ivha/	'a tree'
/yʌvʌ/	'semi-ripe'	/yʌvhʌˀi/	'elsewhere on the road'
/ḳuwʌ/	'steal'; 'nearby'	/ḳuwhʌ/	'to clear ground'
/wʌnʌ/	'he will go'	/whʌunʌ/	'they will go down'
/uwha/	'sand'	/uvha/	'pinched in'
/yaˀa/	'chills'	/yhaˀa/	'sleep'
/yenʌ/	'he will shell (beans)'	/yhenʌ/	'he will close the door'

3.5 Clusters Involving /w/

The occurrence of /ḳw/ as C_1C_2 is frequent, but other combinations with /w/ are rare.

/ḳweˀa/	'dry (wood)'	/ḳweapʌti/	'I came down'
/ḳwiˀi/	'badly'	/ḳwaˀʌwʌ/	'outside'
/kweˀʌ/	'recite'	/kwaitɨmʌ/	'sun-drying fruit'

/mweapʌhi/	'Don't come down!'	/pwenʌ/	'he will come down'
/nweaptʌ/	'he came down'	/twino/	'we two will take them off'

3.6 Vowels

(a) The vowels have approximately the following norms:

/i/ = [i]	/ɨ/ = [ɨ]	/u/ = [u]
/e/ = [ɛ^]	/ʌ/ = [ʌ]	/o/ = [o]
	/a/ = [a]	

(b) All vowels but /a/ have lower allophones following /ḳ/, and /i/ becomes glided [ᵊi].

/ki/	'dirt'	/ḳi/	[ḳᵊi]	'you two'

(c) When the vowels /i, e, u, o/ follow /y/ or /yh/, they have allophones that are shifted half-way towards the centre of the vowel chart. There is a similar but lesser effect following /t/.

/yi/	[žɩ˃]	'arrow'
/ye?ʌ/	[žɛ˃?ʌ]	'ours (dual)'
/yu?wʌ/	[žʊ˂?wʌ]	'stale sweet potato'
/yo/	[žo˂]	'forget'

(d) When /u/ follows a vowel and precedes a consonant, especially /y, n, t/, it has a rare free variant, lenis [y̦].

/ḳhoukʌ/	[ḳʰɔᶷkʌᵛ], [ḳʰɔy̦kʌᵛ]	'long'
/hʌuyeŋḳʌ/	[hʌuy̟ɛŋḳʌᵛ], [hʌy̦y̟ɛŋḳʌᵛ]	'green'

(e) In the V_1V_2 sequences /iu/ and /ui/, the second vowel seems to be syllabic whereas in the other V_1V_2 sequences the first vowel is syllabic.

4. ADDITIONAL PHONEME SEQUENCES

4.1 Syllable Onset /Cwh/

A few words, especially verbs, contain syllable initial clusters of three consonants /pwh/, /twh/, /kwh/, /ḳwh/, in which /wh/ = [W].

/i?apwhiunʌ/	'they will moisten it with their tongues'
/twhiunʌ/	'they will take it off'

/ikwha/	'a pigeon'
/ḳwha/	'conversation'

These triple clusters may be followed by a variety of vowels and vowel clusters: /i/, /a/, /iu/, /au/, and /eu/ in the instances noted. As all of these fit the V_3V_4 pattern established for syllable nuclei, we conclude that the /Cwh/ clusters are a more complex but quite genuine form of syllable onset. As a result, the structure of a syllable can now be represented by

$$(C_1)(w)(h)\ V_3\ (V_4)(C_5)$$

4.2 Syllable Nucleus /Viu/

A lot of words, especially verbs, contain syllable medial clusters of three vowels: /eiu/, /ʌiu/, /aiu/, and /oiu/, in which the first vowel is the syllabic one of the three.[3]

/khʌiunʌ/	'they will dish up'
/mheiunʌ/	'they will go down and get'
/mhaiunʌ/	'they will move it'
/yhʌiunʌ/	'they will close the door'
/muˀathweiunʌ/	'they will overtake going down'

As these vowel clusters have the same timing as a single vowel syllable nucleus, as they appear only ever to carry one toneme, and as they may be preceded by two and three consonants as a syllable onset, it is concluded that /Viu/ clusters constitute a more complex but quite genuine syllable nucleus.

4.3 Other Vocoid Sequences

Many additional vocoid sequences have been observed, but in all cases they contain two syllabic vowels rather than one. Some of these sequences clearly involve two syllables, since there is an intervening non-syllabic high vocoid [i] or [u] between the two syllabic vocoids. These high vocoids have been treated as /y/ or /w/, belonging to the onset of the second syllable, rather than as non-syllabic /i/ or /u/, belonging to the nucleus of the first syllable.

/uyʌwʌ/	'plant' (n.)
/tiya/	'here'

---

[3] At the time of my fieldwork I believed that there were instances of /oiu/, but I cannot find any now without further fieldwork. From the dictionary we may guess at /paithoiunʌ/ 'they will stand it on edge'.

/tuwa/	'back'

Other words have vocoid sequences containing two syllabic vowels contiguous to each other.

/ḳweapi/	'he is coming down'
/ḳeavi/	'he is opening his mouth'

In all such instances the two syllabic vowels are treated as belonging to two separate syllables. Despite this, when the sequence /ea/ precedes /ŋk/ or /ŋḳ/, the two vowels coalesce to produce one long vovoid [æ·].

/keaŋko/	[kæ·ŋko]	'belch'

4.4 Alternative Analyses

As a result of the additional syllable complexity introduced in sections 4.1 and 4.2, the expanded general formula for a Kapau syllable may now be written as

(a)

$$\underbrace{\begin{matrix}(C_1)&(w)&(h)\\1&2&3\end{matrix}}_{\text{onset}}\ \underbrace{\begin{matrix}V&(i)&(u)\\4&5&6\end{matrix}}_{\text{nucleus}}\ \underbrace{\begin{matrix}(C_7)\\7\end{matrix}}_{\text{coda}}$$

in which C_1 = /p, t, k, ḳ, m, n, ŋ, v, y/
C_7 = /m, n, ŋ/.

It may be suggested that the non-syllabic vocoids in positions 2, 5, and 6 could be treated differently, and this leads to three alternative formulas.

(b)

$$\underbrace{\begin{matrix}(C_1)&(h)\\1&2\end{matrix}}_{\text{onset}}\ \underbrace{\begin{matrix}(\genfrac{}{}{0pt}{}{o}{u})&V&(i)&(u)\\3&4&5&6\end{matrix}}_{\text{nucleus}}\ \underbrace{\begin{matrix}(C_7)\\7\end{matrix}}_{\text{coda}}$$

(c)

$$\underbrace{\begin{matrix}(C_1)&(w)&(h)\\1&2&3\end{matrix}}_{\text{onset}}\ \underbrace{\begin{matrix}V\\4\end{matrix}}_{\text{nuc}}\ \underbrace{\begin{matrix}(y)&(w)&(C_7)\\5&6&7\end{matrix}}_{\text{coda}}$$

(d)

$$\underbrace{\begin{matrix}(C_1)&(h)\\1&2\end{matrix}}_{\text{onset}}\ \underbrace{\begin{matrix}(\genfrac{}{}{0pt}{}{o}{u})&V\\3&4\end{matrix}}_{\text{nuc}}\ \underbrace{\begin{matrix}(y)&(w)&(C_7)\\5&6&7\end{matrix}}_{\text{coda}}$$

7. TONE

Suprasegmental features are not mentioned in the Dictionary and Grammar and they are inadequately recorded in the field notes. However, it is clear that words have suprasegmental phonemes as a part of their makeup and that in many instances this is the sole phonemic contrast between words. These phonemes have been called "tone" because pitch seemed to be their most stable feature, but loudness (stress) is very much involved, and perhaps length as well.

One noticeable feature is the way in which the toneme of a monosyllabic word affects the pitch and stress of the following word.[4] The words listed below were studied both in isolation and in a frame--followed by the particle /ti/.

In section 1 above two tonemes were listed, tentatively labelled high /ˊ/ and low /ˋ/. There are at least two tonemes, and one of them does seem to involve high pitch most of the time. But phonetically, there are a lot of up-glides [ˇ] and down-glides [ˆ] in the data and very few consistently low pitches other than on /ti/. The up-glides seem to be associated with slight lengthening of the vowel. Since the analysis of tone has barely been begun, the tone markings on the words given below are quasi-phonetic. They are only approximate because of free variation in the data, but the contrasts which they illustrate are real enough. There seem to be three tone patterns on monosyllabic words, three on disyllabic words, and many on trisyllabic words.

/tʌ́/	'fire'	/há/	'landslide'
/tʌ̌/	'this'	/pǎ/	'husk'
/fʌ̌/	'hole'	/ʌ́/	'that'
/fʌ̀/	'another'	/hʌ̀/	'like'
/yɨ́mŋʌ́/	'wind'	/áwʌ́/	'middle'
/yhɨ́mŋʌ̀/	'wall'	/áwʌ̀/	'fat, grease'
/ḳǎmŋʌ́/	'moon'	/hǎwʌ́/	'thigh'; 'level place'

---

[4] This is rather reminiscent of the forward effects of Telefol up and down tonemes (Healey 1964:47-9).

/ɨ́mtʌ́/	'hair'	/híŋó/	'eye'
/ɨ́mtʌ̀/	'hungry'	/híŋò/	'nose ornament'
/ɨ̌mḳʌ̂/	'ripe'	/hǐŋʌ̂/	'hiccup'
/hʌ́ŋʌ́/	'play'	/hópʌ́/	'pandanus nut'
/hʌ́vʌ̀/	'knife'	/ḳókʌ̀/	'a tree'
/tʌ̌ŋʌ̂/	'sick'	/ḳópʌ̂/	'flying fox'
/ámˀʌ́/	'wild banana'	/hépʌ́/	'tobacco'
/ʌ́mˀnʌ̀/	'into there'	/ḳétʌ̀/	'good'
/ámˀnʌ̂/	'none'	/hépʌ̂/	'take it down off'
/mátʌ́pʌ̀/	'pierce through'	/hʌ̀ˀókʌ̀/	'rattan'
/mʌ̀tʌ́kʌ̀/	'rat'	/hʌ̀vǎkʌ̂/	'flood water'
/mátʌ̀kʌ̀/	'toothpick'	/hʌ̀ḳwǎŋʌ̂/	'tree moss'
/ípɨ́ŋḳʌ́/	'cucumber'	/hʌ̀ḳwàŋʌ́/	'tusk, eye tooth'
/ípɨ́ŋḳʌ̀/	'put clothes on'	/kíŋkʌ̀hú/	'to roll'

BIBLIOGRAPHY

Healey, Alan, 1964. Telefol Phonology. Pacific Linguistics B-3, 53 pp.

Hooley, B.A. and K.A. McElhanon, 1970. Languages of the Morobe District--New Guinea. Pacific Linguistics C-13:1065-1094.

Lloyd, J. and A. Healey, 1970. Barua Phonemes: A Problem in Interpretation. Linguistics 60:33-48. Partially reprinted in this volume, pp.5-15.

Lloyd, Richard G., 1973. The Angan Language Family. In Karl Franklin, ed. The Linguistic Situation in the Gulf District and Adjacent Areas, Papua New Guinea. Pacific Linguistics C-26:33-110 (especially pp.38-47).

New Tribes Mission, n.d. (about 1967). Kapau Dictionary. New Tribes Mission: Bulolo. 70 pp.

Oates, W. and L. Oates, 1968. Kapau Pedagogical Grammar. Pacific Linguistics C-10, v + 178 pp.

Healey, Phyllis M., editor. 1981. *Angan languages are different: Four phonologies.* Language Data, Asian-Pacific Series, 12. Ukarumpa: Summer Institute of Linguistics. 120 p.